ROBOTICS

Contrôle des processus de désassemblage à l'aide des formalismes des systèmes à évènements discrets

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Disassembly process control involves the methods and techniques used to safely and efficiently disassemble mechanical components or complex assemblies. To do this, control approaches are developed to satisfy the constraints imposed on these systems. More specifically, in this thesis we are interested in three types of specifications: marking constraints, Generalized Marking Constraints (GMCs), and Mutual Exclusion Constraints (MECs).To this aim, we have proposed three analytical methods. The first contribution concerns a new technique for designing control laws for disassembly systems to ensure the satisfaction of marking constraints in Timed Event Graphs (TEGs) with some uncontrollable input transitions. The second technique focuses on controller synthesis while ensuring GMCs specified by weighted inequalities in the Min-Plus algebra subject to GETs. The final method aims to control disassembly processes modelled by Timed Event Graph Networks (NGETs) imposed on MECs.Alternatively, it is worth noting that these approaches are based on the conceptual structures of Discrete Event Systems (DES) and the Min-Plus algebra. These tools offer the ability to represent manufacturing systems accurately and methodically. Consequently, the problem is formulated using linear control models based on Min-Plus algebra. In fact, the behaviour of these graphs is described using linear Min-Plus equations, and constraints are expressed by inequalities or weighted inequalities in the Min-Plus algebra.Sufficient conditions for the existence of causal control laws are established. These developed controllers are state feedbacks that can be represented by monitoring places preventing the system from any constraint violation. The graph is alive and unblocked.